



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,945	03/19/2004	Curtis R. Priem	NVDA P000455	9182
26291 7590 04/05/2007 PATTERSON & SHERIDAN L.L.P. 595 SHREWSBURY AVE, STE 100 FIRST FLOOR SHREWSBURY, NJ 07702			EXAMINER CLEARY, THOMAS J	
			ART UNIT 2111	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/05/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/804,945

Applicant(s)

PRIEM, CURTIS R.

Examiner

Thomas J. Cleary

Art Unit

2111

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17, 18 and 20-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17, 18 and 20-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-15, 17-18, and 20-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims recite the limitation "the thread" at various locations. It is unclear if this is referring to the thread which is being scheduled, the other threads, or the additional thread.

3. Claims 21 and 22 recite the limitation "the thread for interrupt processing" in Line 2 of Claim 21. There is insufficient antecedent basis for this limitation in the claim.

4. The term "another interrupt" in Claim 22 is a relative term which renders the claim indefinite. No interrupt has been previously claimed to which the term "another interrupt" relates to. It is unclear what the interrupt to which this is another interrupt is.

5. The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A

claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

6. Claims 3, 5, 10, and 20 are rejected under 35 U.S.C. 112, fourth paragraph, for failing to further limit the parent claim.

7. Claim 3 recites the limitation of "said latency information is representative of time units". Latency, by definition, is information related to time. Thus, the latency information is information representative of time units.

8. Claim 10 recites limitations which are substantially similar to those of Claim 3 and is rejected under similar reasoning.

9. Claim 5 recites the limitation of "said latency information represents a time at which a scheduled thread will be processed". Claim 1, from which Claim 5 depends, recites the limitation of "rearranging an order in which the thread and the other threads will be serviced to schedule the thread for processing in accordance with said latency information". Thus, the latency information of Claim 1 represents a time at which a scheduled thread will be processed.

10. Claim 20 recites limitations which are substantially similar to those of Claim 5 and is rejected under similar reasoning.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1, 3-6, 9-10, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent Number 5,826,081 to Zolnowsky ("Zolnowsky").

13. In reference to Claim 1, Zolnowsky discloses a method for scheduling the service of a thread, said method comprising the steps of: masking interrupts from one or more hardware devices in order to ignore interrupts for other threads (See Column 6 Lines 34-42); acquiring a latency associated with a thread (See Column 6 Lines 45-52); unmasking interrupts from the one or more hardware devices in order to detect interrupts for the other threads (See Column 6 Lines 34-42); and rearranging an order in which the thread and the other threads will be serviced to schedule the thread for processing in accordance with said latency information (See Column 6 Lines 48-52).

14. In reference to Claim 3, Zolnowsky discloses the limitations as applied to Claim 2 above. Zolnowsky further discloses that said latency information is representative of time units (See Column 6 Lines 48-52).

15. In reference to Claim 4, Zolnowsky discloses the limitations as applied to Claim 3 above. Zolnowsky further discloses that said latency information represents a time duration that is necessary to service the thread (See Column 6 Lines 48-52).

16. In reference to Claim 5, Zolnowsky discloses the limitations as applied to Claim 3 above. Zolnowsky further discloses that said latency information represents a time at which said scheduled thread will be processed (See Column 6 Lines 48-52).

17. In reference to Claim 6, Zolnowsky discloses the limitations as applied to Claim 3 above. Zolnowsky further discloses that said latency information represents a time duration that is necessary to setup the thread (See Column 6 Lines 48-52).

18. Claim 9 recites limitations which are substantially equivalent to those of Claim 2 and is rejected under similar reasoning.

19. Claim 10 recites limitations which are substantially equivalent to those of Claim 3 and is rejected under similar reasoning.

20. In reference to Claim 20, Zolnowsky discloses the limitations as applied to Claim 1 above. Zolnowsky further discloses that said latency information represents a time

duration that is used to determine when the thread should be activated for processing
(See Column 6 Lines 48-52).

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

22. Claims 1-15, 17-18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Number 6,085,215 to Ramakrishnan et al.
("Ramakrishnan") and "Process Management – Scheduling" ECEN5043 Software Engineering of Multi-Program Systems, University of Colorado, Boulder ("ECEN5043").

23. In reference to Claim 1, Ramakrishnan discloses a method for scheduling the service of a thread, said method comprising the steps of: masking interrupts from one or more hardware devices in order to ignore interrupts for other threads (See Column 4 Lines 44-48, Column 5 Lines 23-28, and Column 7 Lines 22-52); acquiring a latency associated with a thread (See Column 10 Lines 48-64); and unmasking interrupts from the one or more hardware devices in order to detect interrupts for the other threads (See Column 4 Lines 44-48, Column 5 Lines 23-28, and Column 7 Lines 22-52).

Ramakrishnan further discloses the use of latency information when scheduling the threads (See Column 10 Lines 48-64), but does not disclose rearranging an order in which the thread and the other threads will be serviced to schedule the thread for processing in accordance with said latency information. ECEN5043 discloses that the use of a shortest job first algorithm for scheduling threads is well known in the art (See Pages 24 and 38).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the device of Ramakrishnan with a shortest job first scheduling algorithm instead of a round robin scheduling algorithm, resulting in the invention of Claim 1, because Ramakrishnan discloses that the latency requirements of the thread are important when scheduling threads (See Column 10 Lines 48-64 of Ramakrishnan), and because a shortest job first algorithm will always produce the minimum average response time for batch systems, such as that of Ramakrishnan (See Page 38 of ECEN5043), and because it is provably optimal for simultaneously available jobs, such as those of Ramakrishnan (See Page 24 of ECEN5043).

24. In reference to Claim 2, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 1 above. Ramakrishnan further discloses that said latency information is computed based on a buffer size (See Column 11 Lines 24-47).

25. In reference to Claim 3, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 2 above. Ramakrishnan further discloses that said latency information is representative of time units (See Column 10 Lines 55-57).

26. In reference to Claim 4, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 3 above. Ramakrishnan further discloses that said latency information represents a time duration that is necessary to service the thread (See Column 10 Lines 55-57).

27. In reference to Claim 5, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 3 above. Ramakrishnan further discloses that said latency information represents a time at which said scheduled thread will be processed (See Column 10 Lines 58-60).

28. In reference to Claim 6, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 3 above. Ramakrishnan further discloses that said latency information represents a time duration that is necessary to setup the thread (See Column 10 Lines 55-57).

29. In reference to Claim 7, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 3 above. Ramakrishnan further discloses that said latency information

is dependant on a hardware constraint for one of the one or more hardware devices
(See Column 11 Lines 24-47 and Column 12 Lines 43-55).

30. In reference to Claim 8, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 3 above. Ramakrishnan further discloses that said latency information is provided by a device driver (See Column 12 Lines 43-55).

31. Claim 9 recites limitations which are substantially equivalent to those of Claim 2 and is rejected under similar reasoning.

32. Claim 10 recites limitations which are substantially equivalent to those of Claim 3 and is rejected under similar reasoning.

33. Claim 11 recites limitations which are substantially equivalent to those of Claim 7 and is rejected under similar reasoning.

34. In reference to Claim 12, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 11 above. Ramakrishnan further discloses that said hardware constraint is a size of a buffer (See Column 11 Lines 24-47).

35. In reference to Claim 13, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 11 above. Ramakrishnan further discloses that said hardware constraint is a fullness of a buffer (See Column 11 Lines 24-47).

36. In reference to Claim 14, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 11 above. Ramakrishnan further discloses that said hardware constraint is dynamically computed based on a buffer size (See Column 11 Lines 41-42).

37. Claim 15 recites limitations which are substantially equivalent to those of Claim 8 and is rejected under similar reasoning.

38. In reference to Claim 17, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 1 above. Ramakrishnan further discloses toggling an interrupt line (See Column 10 Lines 31-47).

39. In reference to Claim 18, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 1 above. Ramakrishnan further discloses determining the thread should be activated; and activating the thread for processing (See Column 4 Lines 16-32).

40. In reference to Claim 20, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 1 above. Ramakrishnan further discloses that said latency information represents a time duration that is used to determine when the thread should be activated for processing (See Column 10 Lines 58-60).

41. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramakrishnan and ECEN5043 as applied to Claim 1 above, and further in view of US Patent Application Publication Number 2002/0083143 to Cheng ("Cheng").

42. In reference to Claims 21 and 22, Ramakrishnan and ECEN5043 disclose the limitations as applied to Claim 1 above. Ramakrishnan and ECEN5043 do not disclose creating the thread for interrupt processing when one of the one or more hardware devices is initialized; and freeing the thread when the one of the one or more hardware devices is shut down, as in Claim 21, and creating an additional thread for interrupt processing of another interrupt that the one of the one or more hardware devices is configured to generate, wherein a first interrupt identification number is associated with the thread and a second interrupt identification number that is different than the first interrupt identification number is associated with the additional thread; and freeing the additional thread when the one of the one or more hardware devices is shut down, as in Claim 22. Cheng discloses that it is well known to create a thread when a device is added to a system and to free a thread when a device is removed from a system (See Figure 6 and Paragraphs 67-73 and 24). The device of Cheng would inherently use

Art Unit: 2111

different identification numbers for the thread, as the device would be inoperable the same identification number was used for multiple

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the thread creation of Cheng in the device of Ramakrishnan and ECEN5043, resulting in the invention of Claims 21 and 22, because Ramakrishnan is silent as to how the threads are created and one of ordinary skill in the art would naturally look to methods of creating threads; and to allow both plug and play and non plug and play devices to be used in the same network system (See Abstract and Paragraphs 8 and 74).

Drawings

43. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitations of Claims 21 and 22 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet,

Art Unit: 2111

and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Response to Arguments

44. Applicant's arguments with respect to Claims 1-15, 17-18, and 20-22 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

45. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: "Dynamic Scheduling of Hard Real-Time Tasks and Real-Time Threads" by Schwan et al., and "The Spring Scheduling Coprocessor: A Scheduling Accelerator" by Burleson et al.

46. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

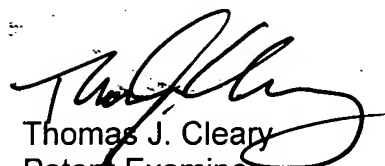
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas J. Cleary whose telephone number is 571-272-3624. The examiner can normally be reached on Monday-Thursday (7-3), Alt. Fridays (7-2).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Rinehart can be reached on 571-272-3632. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Art Unit: 2111

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TJC



Thomas J. Cleary
Patent Examiner
Art Unit 2111



Glenn A. Auve
Primary Patent Examiner
Technology Center 2100